Chapter 15
Waste Monitoring and Performance Measurement

This chapter briefly describes what the 1992 measurement chapter set out to do, identifies and examines some of the problems encountered, and recommends solutions. The underling philosophy of the 1992 chapter remains but new standards for monitoring and measuring the County's municipal solid waste (MSW) and recycling streams are incorporated. This chapter also explores what additional data is needed to measure the effectiveness of the County's waste reduction, recycling and waste diversion programs. Monitoring and measurement approaches for special wastes are described in the chapter on *Special Wastes*.

Introduction

Primary reasons to monitor recycling and waste generation data:

- Assistance with planning and decision-making;
- Setting waste reduction, recycling or diversion goals;
- Identifying waste generation and recycling trends;
- Determining the viability and capacity of existing solid waste recycling and disposal facilities.

In order to improve programs, data must be measured and used consistently in day-to-day management. Performance measures (outputs) are intended to measure progress towards the end result (outcome). For example, the end result of an effective solid waste reduction program is to reduce waste.

The County does not have dedicated staff to measure every aspect of the waste stream, and, even if it did, measurement depends on accurate data. Consequently, the County must pick the most significant data to consistently track and measure to show how well programs are working. The following types of data are most important in measuring a program's effectiveness:

- Waste recycling and diversion rate;
- Per person waste generation rate (residential);
- Municipal solid waste tonnage received at transfer stations;

- Pounds per household per month collected through residential curbside recycling programs;

- Monthly contracted recycling program reports.

Existing Conditions

In 1998, the state legislature amended the Solid Waste Management Act RCW 70.95 and WDOE 90.11 outlines which wastes will be measured in calculating the state's recycling rate:

"To measure this rate accurately, it has been determined that only municipal and commercial recyclables, including any organic wastes which are processed for recycling or composting, are included in the actual statewide tally. Waste reduction efforts should only be included in a tally if a jurisdiction has established a method to measure achieved waste reduction, which is acceptable to Ecology. Recycling of other wastes, such as sewage sludge, industrial waste, asphalt and demolition wastes are encouraged, but are not to be included in the statewide tally."

1992 Clark County Recycling Goal

The 1992 Clark County Solid Waste Management Plan did not set an overall recycling rate goal. In the 1992 plan, the waste recycling goal for Clark County and the cities was to recycle 50 percent of the per persons and per employee waste generated in 1992 by 1995. The waste reduction goal was based on a 1% annual decrease in per person and per employee waste generation.

2000 Clark County Waste Recycling Rate (In accordance with EPA measurement guidelines)

The recycling rate is the percentage of all waste generated by residents and businesses that is recovered and made into new products. Calculating the recycling rate is complicated. It involves collecting garbage and recycling data from a variety of measurable sources. Only those materials re-manufactured into new products are considered to be recycled, according to new guidelines established by the Environmental Protection Agency (EPA) and adopted by the City of Vancouver and Clark County Solid Waste Programs. The following section shows the calculation of the 2000 Clark County waste recycling rate.

Equation For Calculating the Waste Recycling Rate	
MSW Recycling Rate	Total MSW Recycled
	Total MSW Generated
Note: MSW Generated = Total MSW tons recycled + Total MSW tons Diverted + Total MSW tons disposed	

Clark County Waste Recycling Rate (2000) 30.7%= $\frac{135,041}{135,041 + 92,958 + 211,674}$

2000 Clark County Waste Diversion Rate

Another measurement of success is the "waste diversion rate," which allows credit for materials that are diverted from the landfill, but are not, by definition, "manufactured into new products". Examples of waste diversion include: wood and yard wastes that are chipped and burned as fuel in industrial burners; other materials burned for fuel: concrete, asphalt and rubble that are crushed and used as aggregate rock substitute; and broken glass (cullet) that is pulverized and used as fill in road and drainage projects. Because special wastes and construction/demolition wastes are included in the diversion rate, these materials are not subtracted from the tons disposed, as is done when calculating the recycling rate.

Equation For Calculating the Waste Diversion Rate	
MSW Diversion Rate =	Total MSW Recycled + Diverted
	Total MSW Generated
Note: MSW Generated = Total MSW tons Recycled + Total MSW tons Diverted + Total MSW tons disposed	
Note: MSW Diverted = Total MSW tons Recycled + Total MSW tons prevented + Total MSW tons energy recovery	

Clark County Waste Diversion Rate 2000 = 51.8%

The MSW tons disposed are based on 2000 Columbia Resource Company (CRC) outbound tonnage, excluding ash and other non-MSW waste.

Table 15-1 summarizes how the recycling and diversion rates are derived.

Table 15-1

Perceived Problem: It is important to note that the waste diversion rate is not precise and is intended as a general representation, not an exact measurement. The rate may need to be adjusted to allow for state and national comparisons

Recommended Solutions:

Tracking non-residential tonnage is difficult, because non-residential programs are not contracted programs, therefore not subject to contractual reporting requirements. Non-residential waste diversion and recycling is driven by the competitive free market, and data is considered proprietary information, making it difficult to obtain. In addition, it is likely that commercial tonnages are under-reported; some recyclables are transported out of the county and some recycling merely goes unreported, as in the case of retail/wholesale corrugated shipments that go directly back to distributors and unknown recyclers. These inconsistencies must be accounted for and best estimates made when working with the City of Vancouver and Department of Ecology data (see additional data requirements).

- Organics waste diversion estimates are based on the amount of material diverted after it enters the waste stream and is measured and reported. Diversion efforts that include backyard composting, grasscycling, vermicomposting and applying chips as mulch are not easily measured. Consequently, they are not considered when calculating the diversion rate.

- The EPA standardized recycling rate shows a more accurate picture of the percentage of collected materials that is being re-manufactured into new products. Recycling is a three-step process, as reflected in the three-arrow logo: collection of materials, processing materials into new products, and buying those products. The county should continue to stress the importance of recycling and buying recycled. The recycling rate should be calculated according to EPA measurement guidelines to allow for local and national comparisons.

- The diversion rate should also be tracked to better understand overall recycling, waste reduction and recovery activities.

Per Person Waste Generation Rate (Residential)

The per person or per-capita waste generation rate is equivalent to the average quantity of residential solid wastes generated per day by each member of the population in the county and the cities. This definition has been standardized as follows:

Equation For Calculating the Per Person Waste Generation Rate	
Per Person Waste =	(Residential generation in tons/year) * (2,000 lb./ton)
Generation Rate	(Population)/(365 days/year)
Note: Residential Generation = Total residential MSW tons recycled/diverted+ Total residential MSW tons	

Residential generation is defined as the amount of residential waste disposed, plus the amount of residential waste recycled. The per person waste generation number is based on data from the contracted recycling programs. The residential waste tonnage is based on a percentage determined from the waste stream analysis studies performed in 1993 and 1999. These studies concluded that an estimated one half (1/2) of the overall waste stream is residential waste. Because waste that is actually discarded is most important, inbound waste tonnage is used (what residents put into their garbage cans and self-haul to the transfer stations).

Table 15-2 shows the per person waste generation rate from 1992 – 2000.

Table 15-2
Residential – Per Person Waste Generation Rate Per Day

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total (inbound) MSW tons (incl. Special Wastes)	170,500	183,200	197,000	197,500	216,500	223,900	223,300	227,260	233,110
Residential tons MSW*	85,250	91,600	98,500	98,750	108,250	111,950	111,650	113,600	116,555
Residential total tons recycled/diverted**	13,500	18,225	22,210	25,785	32,280	38,530	43,610	45,355	49,100
Population	257,500	269,500	280,800	291,000	303,500	316,800	328,000	337,000	345,238
Per Person Per Day Waste Gen. Rate	2.10	2.23	2.35	2.34	2.53	2.60	2.59	2.68	2.62

* based on Waste Stream Analyses (50%)
** includes all residential curbside program tons

Perceived Problem: The waste recycling goal for Clark County and the cities called for a 50 percent diversion of the per person waste generated in 1992 by the year 1995. The waste generated per person has increased, not decreased, since 1992. Some of the apparent increase may be due to better data tracking. The per person waste generation rate may be better used to track waste reduction goals (see waste reduction goals).

Employee Waste Generation Rate (Non-Residential)

The per employee waste generation rate is comparable to the average amount of non-residential solid waste generated per day by people working in the commercial and institutional sectors in the county and cities. This rate is calculated the same way as the per person waste generation rate, except that non-residential waste tonnages and the number of people working in the county and cities are used.

Perceived Problem: The per employee rate has note been calculated due to a lack of non-residential recycling data.

Recommended Solution: Non-residential recycling should be tracked as part of the overall waste recycling and diversion rates.

1992 Clark County Waste Reduction Goals

There were three stated waste reduction goals for the County and Cities:

- The County and Cities will get baseline measurements of residential and non-residential waste generation and of residential and non-residential waste reduction attitudes and behaviors in 1992.
- Per person generation of residential waste in 1995 will not exceed per person generation of residential waste in 1992, and will decrease 1 percent per year after 1995.
- Per employee generation of non-residential waste in 1995 will not exceed per employee generation of non-residential waste in 1992, and will decrease 1 percent per year after 1995.

Perceived Problem: The 1992 waste reduction goal states that per person generation of residential waste in 1995 will not exceed per person generation of residential waste in 1992, and will decrease 1 percent per year after 1995. Table 15-2 shows the upward trend of per person waste generation. The per person waste generation rate in 1995 exceeded the rate in 1992 and has not decreased since. Per employee generation is a difficult number to measure and has not been tracked.

Recommended Solution: Track the per person per day disposal rate. This rate is based on accurate data numbers that are relatively easy to obtain:

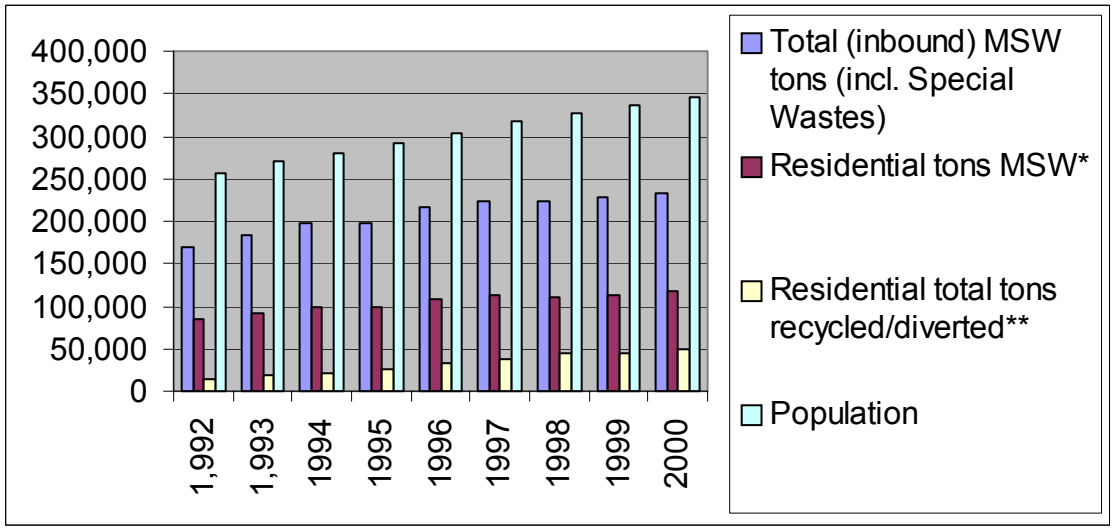
- CRC's in-bound annual MSW tonnage (total waste disposed by households and businesses);
- The annual population.

Clark County Disposal Rate

Equations For Calculating The Per Person Per Day Disposal Rate	
Per Person Per Day Disposal Rate	(Annual In-Bound MSW Tonnage)*(2,000 lb/ton) (Population)/(365 days)
Note: Residential Generation = Total residential MSW tons recycled/diverted +Total residential MSW tons disposed	

Figure 15-1 (on the next page) shows how this rate varies over nine years.

Figure 15-1



Other Measurement Tools

In-bound annual MSW waste tonnage (total waste disposed by households and businesses through the transfer station) is reported by Columbia Resource Company in their monthly reports to the County. The in-bound monthly tonnages are depicted in Table 15-3 and Figure 15-2.

Figure 15-2

Monthly In-Bound Solid Waste in Tons

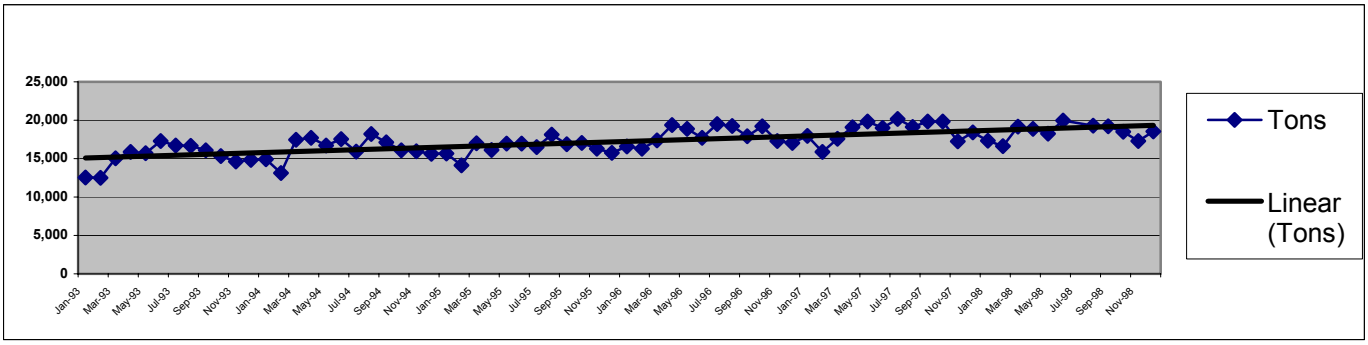


Table 15-3 In-Bound Solid Waste By Month															
93	Tons	94	Tons	95	Tons	96	Tons	97	Tons	98	Tons	99	Tons	00	Tons
Jan	12,555	Jan	14,905	Jan	15,680	Jan	16,580	Jan	17,945	Jan	17,335	Jan	17,520	Jan	18,055
Feb	12,495	Feb	13,145	Feb	14,135	Feb	16,290	Feb	15,865	Feb	16,605	Feb	16,290	Feb	17,855
Mar	15,025	Mar	17,460	Mar	17,010	Mar	17,360	Mar	17,585	Mar	19,155	Mar	19,630	Mar	20,320
Apr	15,865	Apr	17,705	Apr	16,130	Apr	19,365	Apr	19,070	Apr	18,875	Apr	18,830	Apr	18,490
May	15,715	May	16,690	May	16,955	May	18,885	May	19,830	May	18,240	May	18,190	May	20,985
Jun	17,285	Jun	17,555	Jun	16,975	Jun	17,720	Jun	19,000	Jun	19,965	Jun	20,040	Jun	20,715
Jul	16,725	Jul	15,905	Jul	16,500	Jul	19,500	Jul	20,150	Jul	20,300	Jul	20,100	Jul	19,630
Aug	16,685	Aug	18,210	Aug	18,105	Aug	19,270	Aug	19,125	Aug	19,275	Aug	19,555	Aug	21,245
Sep	16,080	Sep	17,130	Sep	16,885	Sep	17,915	Sep	19,845	Sep	19,220	Sep	19,590	Sep	19,685
Oct	15,330	Oct	16,100	Oct	17,050	Oct	19,200	Oct	19,830	Oct	18,480	Oct	18,630	Oct	19,840
Nov	14,260	Nov	15,955	Nov	16,300	Nov	17,275	Nov	17,285	Nov	17,295	Nov	19,025	Nov	18,575
Dec	14,830	Dec	15,625	Dec	15,735	Dec	17,060	Dec	18,410	Dec	18,540	Dec	19,860	Dec	17,720
1993	183,210	1994	196,385	1995	197,460	1996	216,420	1997	223,920	1998	223,285	1999	227,260	2000	233,115

Historically the County has measured residential curbside recycling programs by tracking the number of pounds of recyclables collected (including motor oil and rejects) per household per month. In 1998, over 23,000 tons were collected from nearly 59,000 single-family households, about 65 pounds per household per month. Approximately 2,750 tons were collected from 24,000 multi-family households, or about 19 pounds per household per month.

Needs And Opportunities

On gathering more accurate recycling and waste reduction data

Non-residential Waste Diversion

Clark County needs better monitoring and measuring of non-residential waste generation, recycling and waste prevention activities. Non-residential sectors include commercial, manufacturing, industrial, institutional and federal agency generators. Although RCW 70.95 does not require the County to implement non-residential waste recycling programs, monitoring the non-residential waste stream should be done in order to calculate the County's waste diversion rate, ensure that generators awareness programs for recycling and waste prevention options are effective, and to better understand waste practices by the non-residential sector.

The City of Vancouver's Recycling Ordinance, Chapter 5.62, establishes licensing procedures for all commercial recyclers within the City of Vancouver, with the focus on collectors. Monitoring is accomplished by requiring estimates of the amounts and types of commercial recyclables collected within the City of Vancouver to be reported. County solid waste staff should work with Vancouver solid waste staff to determine

commercial recycling tonnage estimates within the City of Vancouver and Clark County. The County should consider gathering data with a County recyclers' licensing program.

Guidelines for the Development of Local Solid Waste Management plans and Plan Revisions states that the Department of Ecology will provide waste stream information to local governments. The County should work with Ecology on the statewide recycling survey. Note: Much of the non-residential specific data is kept confidential, and the measurement procedures and reporting formats have changed several times, making survey results difficult to confirm and confirm. To minimize double counting, the County needs to get authorization to review confidential information on who is reporting to Ecology.

Waste Stream Analysis Data

The County periodically conducts waste stream analysis to provide a comprehensive picture of the composition of MSW being generated and disposed in Clark County at its two transfer stations. One objective of the waste stream analysis is to provide reliable baseline data that will assist the County in evaluating the effectiveness of existing and future waste reduction, recycling and recovery programs. In addition, monitoring helps determine the actual recycling and waste reduction rate in Clark County. The first waste stream analysis covered the last quarter of 1992 and the first three quarters of 1993. The second waste stream analysis covered the last two quarters of 1995 and the first two quarters of 1996. The third analysis was completed in 1999. Future waste stream analyses are scheduled for 2003 and 2007 per Clark County and CRC Contract (amended section 7.6, Resolution 1996-12-6.5.

Columbia Resource Company Scalehouse Data Tracking – CRC, through its transfer station scalehouse, electronically tracks all commercial vehicle transactions. Large commercial customers, i.e. Waste Management of Vancouver, Waste Connections, Inc. and Evergreen Waste Systems can be tracked by truck number. CRC produces a report, showing the tonnage delivered by a particular truck for the entire year. Trucks that have had the same routes for an entire year could provide disposal tonnage information on generator types (i.e., residential or commercial).

Clark County and the cities may need to develop better estimates of residential single-family, multi-family and non-residential waste and tracking route information would help to achieve better estimates. To obtain information on the remaining self-haul vehicles that cross the scale, CRC and the County, in conjunction with the waste stream analysis, should perform seven-day quarterly surveys of self-haul traffic to gather baseline residential and non-residential waste generation data.

Self-Haul Data

Given the proximity to Portland, it is likely that some wastes will be taken outside of the Clark County Solid Waste System. Because construction contractors often self-haul construction site waste, it is difficult to track the final destination of waste materials. To

enable more accurate tracking the County should survey construction job-sites to determine what types of materials are being generated and where they are going. In the case of public sector construction, the County could directly contact each contractor to track the flow of waste and recyclables from the job.

Residential Contract Service Providers

Contracted programs account for the majority of residential recyclables. Clark County and the cities receive periodic data reports from CRC, Waste Management of Vancouver, Waste Connections Inc. and Evergreen Waste Systems, documenting incoming recycled material tonnages as weighed on the station scales at CTR and West Van transfer stations. Data for total contracted program tonnage is accurate, however the breakdown into separate materials is done by extrapolating the weight of the materials on a single day and deriving a percentage of distribution that will be used until a new study is done. The allocation study provides estimates of the breakdown of materials into separate groups and gives a general picture of the materials collected through the contracted residential programs.

Garbage Haulers

In order to track garbage generation on the per person level, accurate and current information on garbage service levels for both residential and non-residential customers is required. An increase in the number of customers who choose a service level below the weekly 32-gallon can level may be an indicator of how successful recycling and waste reduction programs have been. In addition, data can be compiled for garbage service levels for yard debris customers, before and after they subscribe to the program. This will show reduced garbage volume, resulting from yard debris recycling. Large non-residential garbage customers could be tracked. The largest generators, with the highest volume, could then be targeted for waste reduction technical assistance, including long-term tracking of the results.

Monitoring Effectiveness of Waste Reduction and Recycling Programs

In addition to collecting data on the quantity and types of materials diverted from the waste stream, the County and cities should periodically monitor their waste reduction and recycling programs to determine diversion and participation levels and program effectiveness. Progress must be monitored periodically to determine which programs are satisfactory, and when additional effort is necessary, assist in designing new programs.

Three methods that may be used to monitor and assess the success of waste reduction and recycling programs are:

- **Diversion Rate Monitoring:** Numerically measuring progress toward meeting established goals.

- **Participation Level Monitoring:** Numerically measuring participation levels in targeted programs, based on number of generators participating in the program, pounds of recyclables collected per month or other indicators

- **Waste Reduction Monitoring:** Numerically evaluating the overall effectiveness of waste reduction programs, including progress toward achieving diversion goals and participation levels based on a per person generation and prevention rates

Tracking Behavioral Changes

The types of surveys that could be used for evaluating potential waste reduction and recycling programs and for monitoring the success of existing programs are described below.

Feasibility Survey

A feasibility study provides a clearer picture of how the public will accept a proposed program, its probable success and its cost-effectiveness. This type of study may be performed in the early planning stages and before the program is implemented. In addition, the results could be used to design the initial program.

Pilot Program

A pilot program tests a proposed recycling program with a pre-selected group in a geographically representative area for a specific length of time. This type of test provides actual operating experience with a program in order to determine if it will work as anticipated. A pilot program can provide valuable information on cost characteristics and operations before a new recycling program is started.

Can Weight Study

A can weight study helps to establish a baseline of weekly waste disposed per household. Such a study could be used to prepare for a garbage-by-the-pound program and would also be useful in evaluating the rate setting methodology used by the WUTC for "G" certificated garbage haulers. A garbage-by-the-pound pilot study could be done in conjunction with this study.

The County and the City of Vancouver will want to work with garbage haulers to gather garbage can census data (such as the number of households subscribing to a specific level of garbage service). The waste reduction effect of setting up systems in which the generator's garbage fee is based on the weight of the can could be evaluated by monitoring waste and recyclables in a group of generators, both before and after rates are changed.

The County and Cities should continue to watch their in-house waste reduction programs for efficiency, waste diversion and cost of the total effort and of individual

activities. Results could be used to promote waste reduction to other non-residential generators. The County and Cities could also help other model non-residential generators monitor the effects of waste reduction in their programs.

Capture Rate Survey

A capture rate survey monitors a set of residential households or businesses, which represent a cross-section of the population, to determine the levels of actual waste reduction and recycling. This capture or diversion rate depends on the number and type of participants, how often they participate, how efficiently participants separate their recyclables, and the amount of recyclables in the MMSW stream.

Waste Reduction Survey

A waste reduction survey is done community wide to determine waste reduction activities including composting. This type of study is done to show the types of activities households and businesses use to reduce waste, rather than estimate reduced tonnages that result from these activities. Periodic surveys of the community would show changes in waste management behavior that could be used to determine which programs are likely to be effective.

Waste Audit

A waste audit is a site-specific survey and accounting of waste generations, handling and disposal practices for non-residential and residential waste generators. The audit can also be used to teach generators how to reduce and recycle wastes. Information gathered through waste audits can be used by the County to develop future waste reduction and recycling programs for the non-residential sector.

Target Group Survey

A target group survey assesses how many residents and businesses are participating in specific waste reduction and recycling activities, who is not participating and what motivates waste generators to participate or not participate. When other surveys identify age or socio-economic groups that are not responding to waste reduction and recycling programs, the county could do a target group survey of these groups for special educational programs. These groups could be interviewed to determine why they are not responding to specific programs and to determine what the county could do to help them change their behavior. Results of this type of survey enable the design of additional programs and program modifications that target non-participants.

Direct Observation

Direct observation is a first-hand method of monitoring participation in waste reduction activities and watching specific behavior. For example, the County and Cities could work with:

- Retailers to observe the responses of hoppers to specific waste reduction educational media and messages;

- The Direct Marketing Association (see Chapter 4 – *Waste Prevention and Reduction*) to monitor participation in an unwanted mail reduction campaign;

- Landscapers and landscaping equipment companies to determine how often lawn mowers with special mulching attachments are used.

Both surveys and direct observations could provide useful information about how many residents and businesses are participating and in what kind of activities, including those sponsored or promoted by the County and Cities. Through surveys, the county could also determine why residents and businesses are, or are not, participating in waste reduction activities and what activities and promotional messages have the greatest potential to increase future participation.

Although easier and less expensive than direct observation, participation surveys are limited in their usefulness. Many people don't know what waste reduction is and must be prompted to estimate how much they participate in waste reduction activities. Under these conditions, people often overstate their participation, because waste reduction is seen as a socially positive behavior. However, longitudinal surveys may reveal whether awareness of and participation in targeted waste reduction activities (e.g. home composting and reuse of grocery bags) are increasing.

A program's effectiveness is generally determined by whether it is achieving or surpassing its diversion goals and how many participants it has. Measuring waste reduction and recycling program effectiveness would yield information on how programs can be modified to increase participation and recover more materials or provide better results, using available resources.

Alternatives

The Solid Waste Advisory Commission considered the following alternatives:

1. *Work to develop a legislative update to RCW 70.95 to better define the recycling rate.*

2. *The County should monitor waste reduction and recycling program effectiveness on an annual basis to evaluate program successes and determine where extra effort or program changes are needed.*

3. *The County should continue monitoring the tonnage of MSW generated in Clark County that is not delivered to the CRC transfer stations.*

4. *The County should work in coordination with the Department of Ecology's annual recycling survey and the City of Vancouver's annual licensing report to monitor recycling and diversion rates.*

5. *The County should work with large commercial haulers and Columbia Resource Company to link garbage route information with residential and non-residential MSW tonnage.*

6. *The County should continue to conduct waste characterization studies at the County's transfer stations every four years to monitor the impact of waste reduction and recycling programs and identify potential changes to solid waste program services.*

7. *The County should continue gathering self-haul data by conducting surveys of self-hauled materials flowing through the county solid waste system.*

8. *The County should conduct residential and non-residential can and container weight studies to provide independent validation of garbage collection rate-making assumptions.*

Evaluation Of Alternatives

1. *Work to develop a legislative update to RCW 70.95 to better define the recycling rate.*

The State's legislatively established recycling goal was to reach a 50% rate by 1995. In addition to the missed goal, Washington State reported a drop in the 1997-recycling rate, from 39% to 31%. The controversy on this topic has resulted in various parties giving testimony at State legislature work sessions and in the establishment of a statewide task force to investigate the problem and propose solutions. The County should work to help assess the issues of data accuracy, tracking and definition of the recycling rate in order to develop a legislative update for the goal and the rate.

2. *The County should monitor waste reduction and recycling program effectiveness on an annual basis to evaluate program successes and determine where extra effort or program changes are needed. This monitoring should include recycling, diversion of materials to fuel markets, participation levels and waste reduction.*

Diversion Rate Monitoring

The purpose of measurement activities is to monitor progress toward meeting the established numerical waste diversion goals. The focus of this approach is on calculating the overall waste diversion rate. This calculation requires data on generation, disposal, curbside recycling and other calculation programs, private buy-back and drop-off recycling, composting, non-residential recycling, energy recovery

and waste prevention activities. Diversion monitoring could look at residential and non-residential wastes separately or in aggregate.

Monitoring of diversion rates requires compiling more detailed records and reports on waste stream handlers in the county and greater coordination with Ecology and the City of Vancouver

Participation Level Monitoring

The purpose of participation level monitoring is to assess how many residents and businesses are participating in targeted waste reduction and recycling activities, who is not participating and what motivates the waste generator to participate or not.

Historically the County has measured residential curbside programs by tracking the number of pounds and recyclables collected (including motor oil and reject materials) per households setting out bins on a per month. Goals can be set to improve programs using this measurement method.

Waste Reduction Monitoring

Waste reduction goals require that the residential and commercial waste generated per person be monitored. To properly assess per person rates, all elements of the waste management system need to be included: generation rates, disposal, curbside recycling and other collection programs, private drop-off and buy back recycling, composting, energy recovery, and waste import and export.

3. *The County should continue monitoring the tonnage of MSW generated in Clark County that is not delivered to the CRC transfer stations.*

Tracking non-residential tonnage is sometimes difficult, primarily because self-haul loads or illegally hauled loads to points outside of the Clark County Solid Waste System. Solid waste collection and disposal is regulated within the county. Self-haul loads can be disposed or recovered at any legally permitted facility. Determining the amount of waste hauled to facilities outside of the system may point to a needed option or service within the County's System. Illegally hauled loads, to destinations outside of the County System weaken both the regulatory structure as well as detracting from the repayment of debt commitments on the facilities within the system.

4. *The County should work in coordination with the Department of Ecology's annual recycling survey and the City of Vancouver's annual licensing report to monitor recycling and diversion rates.*

More accurate recycling and diversion rates could be estimated with better data. There are two sources of existing data, which could be utilized more effectively.

The City of Vancouver's Recycling Ordinance requires that estimates of the amount and types of commercial recyclables collected within the City of Vancouver be reported. County solid waste staff should work with Vancouver solid waste staff to determine

commercial recycling tonnage estimates within the City of Vancouver and Clark County.

The Department of Ecology conducts an annual statewide recycling survey, gathering data from recyclers about the amount of materials, which are collected statewide, by region, for recycling. Viewing the survey data would help to minimize double counting in the County's estimation of its recycling and diversion estimates.

5. *The County should work with large commercial haulers and Columbia Resource Company to link garbage route information with residential and non-residential MSW tonnage.*

Tracking garbage generation on the per-person level requires accurate and current information on garbage service level below a certain point, for both residential and non-residential customers. An increase in the number of customers signing up for a particular recycling service, and a decrease in the disposal tonnage may all be indicators of how successful recycling and waste reduction programs have been. In addition, data can be compiled for garbage service levels for customers, before and after they subscribe to recycling programs. Having information about the disposal weights can assist in rate setting.

6. *The County should continue to conduct waste characterization studies at the County's transfer stations every four years to monitor the impact of waste reduction and recycling programs and identify potential changes to solid waste program services.*

The County has regularly conducted waste stream analysis since 1992 in order to provide a comprehensive picture of the composition of MSW being generated and disposed in Clark County at its two transfer stations. The analysis provides information on new waste disposal trends, effectiveness of recycling, waste prevention and recovery programs. In addition, monitoring helps determine the actual recycling and waste reduction rate in Clark County.

7. *The County should continue gathering self-haul data by conducting surveys of self-hauled materials flowing through the County Solid Waste System.*

More data is needed in order to develop better estimates of residential single family, multi-family and non-residential waste generation. CRC has the ability to obtain information the self-haul vehicles that cross the scale. The County could perform surveys of self-haul traffic to gather baseline residential and non-residential waste generation data.

8. *The County should conduct residential and non-residential can and container weight studies to provide independent validation of garbage collection rate-making assumptions.*

A can weight study helps to establish a baseline of weekly waste disposed per household or per business. Such a study could be used to prepare for a garbage-by-

the-pound program or could be useful in evaluating the rate setting. A garbage can census and weight data would also provide an indicator for the effectiveness of waste reduction activities. Future rate structure changes and any resulting impacts on generator disposal behavior could also be tracked this data.

Recommendations

The County Solid Waste Advisory Commission reviewed the complete list of Alternatives and has recommended the following alternatives.

1. *Work to develop a legislative update to RCW 70.95 to better define the recycling rate.*

2. *The County should monitor waste reduction and recycling program effectiveness on an annual basis to evaluate program successes and determine where extra effort or program changes are needed.*

3. *The County should evaluate methods for establishing the tonnage of MSW generated in Clark County that is not delivered to the CRC transfer stations.*

4. *The County works in coordination with the Department of Ecology's annual recycling survey and the City of Vancouver's annual licensing report to monitor recycling and diversion rates.*

5. *The County should work with large commercial haulers and Columbia Resource Company to link garbage route information with residential and non-residential MSW tonnage.*

6. *The County should continue to conduct waste characterization studies at the County's transfer stations every four years to monitor the impact of waste reduction and recycling programs and to identify potential changes to solid waste program services.*

7. *The County should continue gathering self-haul data by conducting surveys of self-haul materials flowing through the county solid waste system.*

8. *The County should conduct residential and non-residential can and container weight studies to provide independent validation of garbage collection rate-making assumptions.*